

## HIDDEN HOMES.

BY ANNA BOTSFORD COMSTOCK.



A BRANCH of sumac with its drum-major plumes, abough of elder bending under a load of its dark-hued berries, a raspberry bramble, low trailing and

graceful; these were my trophies from Woodland, one sunny October afternoon; and to the uninitiated they doubtless would seem but random and commonplace mementos of an autumnal ramble. But listen, and I will tell you how such branches, seemingly uninteresting and aimlessly gathered, have been the scenes of great toil, brave deeds, faithful, loving devotion, and also, alas! of treachery and tragedy. I will relate to you the history revealed by these broken boughs; a history to discover which has required many patient hours and much close watching by eyes that loved the work.

One sunshiny morning last May, had you been watching, you might have seen a gay little insect,

not more than one-fourth of an inch long, flitting about among these branches, her body metallic blue, and with four gauzy wings flashing in the sunlight. Had you noted her then, you would have thought her created only for the enjoyment of a bright spring day. Little would you have dreamed of the strength of purpose and the power of endurance bound up in that wee body. You perhaps would have scarcely detected that she belonged to a family noted for their perseverance and industry. Yet, in spite of her diminutive size and metallic color, she is as truly a bee as the clumsiest bumblebee that ever hummed in the clover. She belongs especially, however, to the group of carpenter-bees; and she has a pretty scientific name, *Ceratina dupla*, that seems quite in keeping with her dainty appearance.

However, very little cares she by what Latin name mortal man has chosen to call her, for weightier responsibilities rest upon her active mind this bright May morning, and so she hunts about until she finds some broken twig of elder or of sumac which permits her to come into direct contact with the pith of the plant. Then our little heroine, with the aid of her mandibles, or jaws, goes to work to excavate a tunnel in the branch by removing the pith mouthful by mouthful. Very carefully is the work done, the pith being neatly cut so that the walls of the tunnel are left straight and smooth. To bring her undertaking within our comprehension we might compare her to a man who should attempt to dig a well three or four feet wide and two hundred feet deep, with no tools but his hands with which to remove the earth.

The tunnel of the *Ceratina* is about one-eighth of an inch in diameter, and often as much as eight or ten inches in depth. But when our little bee is through excavating her tunnel, and has finished it with all the nicety of her own fine sense of the fitness of things, she has really but begun her summer's work. However, her next task combines pleasure with duty, for it takes her into the fields to gather pollen from the flowers. This she carries by loading it upon her hind legs, which are furnished with long hairs for holding it in place. But

it requires a great many trips back and forth before she has packed the bottom of the nest with pollen to the depth of a quarter of an inch. This done, she deposits upon it a tiny white egg, and above builds a partition by gluing together bits of pith and other suitable material with a glue which she always keeps on hand (or rather *in mouth*) for the purpose. This partition is firmly fastened to the sides of the tunnel and is about one-tenth of an inch in thickness; it serves as a roof for the first cell, and as a floor for the next. Then the process is repeated; she gathers more pollen, lays another egg, builds another partition, and so on, until the tunnel is filled to within an inch or two of the opening; the last egg is thus necessarily deposited many days after the first one.

So you see this matron has her family in a sort of apartment-house, each individual occupying one entire flat. Then there comes a rest for the industrious little mother; for her next duty is to remain quiet and await future developments. But her fidelity is unailing; the inch or two of space left at the top of the tunnel serves as a vestibule to her dwelling, and there she waits and watches over her home.

While she is guarding the door let us take a peep into the first cell and see what is taking place there; for what we find true of one cell will prove equally true of all the others. The egg soon hatches out a minute, white, footless worm or larva which falls to work immediately, eating with all its might the pollen provided by its careful mamma. On this food it thrives and grows, until it is a quarter of an inch long; by this time, usually, it has consumed all the pollen in the cell; however, the mother-bee's instinct does not seem to be infallible in this particular, for sometimes she provides more food than her child needs. After the larva has thus reached its full growth, it becomes rigid and turns darker in color, and queer-looking seams and excrescences appear upon it; these are the cases in which its legs and wings are developing.

In short, it becomes a *pupa*. After remaining thus for some time the pupa-skin bursts open, and a full-fledged bee appears, in size, color, and in every respect resembling its mother; for, you know, bees never grow after they have their legs and wings. Meanwhile, the patient mother, who has not shared our privilege of peeping into the cells, knows nothing of what has happened, unless perchance she remembers her own "larvahood." Her experience is a novel one; her first-born is the last one of the brood that she beholds. You see, patience is taught to these creatures, as an early lesson; for, of course, the egg first laid is the earliest to hatch and soonest reaches maturity. So the first experience of the eldest of a *Ceratina* brood is to wait until its youngest brothers and sisters have reached their adult form. We may



THE TUNNEL HOME OF THE *CERATINA DUFLA*, ONE OF THE GROUP OF CARPENTER BEES.

imagine that this idle waiting is rather hard work for a little creature with brand-new wings which it is longing to spread in the sunshine.

The next lesson that our *Ceratina* must learn is industry. For when the youngest of the brood has reached maturity, each one in the nest begins to work its way up and outward by tearing down the partition above it and pushing the particles of

waste material down toward the bottom of the nest. This arrangement is a comfortable one for the youngest, who has only one partition between it and its mother, but is not nearly so nice for the eldest, who has had not only the longest time to wait, but has now the most work to do: for he must push his way up through the débris of all the partitions above him. It reveals a funny sight to open a Ceratina nest after the material of the partitions has been stowed away in the bottom of the tunnel. There are all the bees,—sometimes as many as fourteen,—packed in as close as possible, each with its head toward the opening, and braced against the “heels,” so to speak, of his next youngest brother; for nature teaches them to face toward the door that leads out into the world. Finally, the sentinel mother, having become satisfied that all are ready, leads the way and chaperons her children in their first flight out into the sunshine.

Later, the remains of the partitions are removed from the nest, which is thus made ready for another brood. Sometimes the whole grown-up family are found in nests thus cleaned, which would indicate that the young bees dutifully lend their mother a helping mandible in house-cleaning and making the home attractive. And they doubtless find it pleasant to linger about the old homestead and make it their abiding place until they feel capable of setting up establishments of their own. This is certainly true of the fall brood; these children of the autumn, when the days become cool, crawl into the clean nest, head downward, one after another, and tuck themselves in, we might say, as cosy as cosy can be, and just go to sleep, and stay asleep, until the bright May sunshine calls to them through the open door and tells them to wake up and go to work. We found one family of eight thus housed for the winter; and the bee next the door was the faithful mother,—we recognized her because her wings were frayed and worn by her many flights and severe toil. I have often wondered if this long winter's sleep were not brightened by dreams of sun and flowers. How do we know that this is not a bee's way of spending the winter in Florida?

Thus we have learned the main facts in the life of our little Ceratina supposing that her life is a fortunate one from egg-hood to motherhood. But in our studies of these hidden homes we find records of wars and tragedies, and thus learn that our tiny friend has many enemies always watching for an opportunity to injure her. Among these foes are some of her own lazy relatives, first and second cousins, who certainly ought to have better manners and morals. Other species of bees, and some

wasps which build their nests in the hollow stalks of plants, take advantage of the tunnel excavated by the Ceratina, drive her away before her nest is finished, and take possession of her home. We may safely believe that the plucky little bee would not submit to such an outrage without vigorous remonstrance; and doubtless there are duels fought which equal in bravery and fierceness any that we read about in stories of the Middle Ages.

There are still other enemies of the Ceratina, too cowardly to achieve their objects by a fair fight. One of these, a light and airy insect, with a scimitar-shaped body, belongs to the *Ichneumonida*, a family noted for deceitfulness and immoral conduct, to say nothing of bloodthirstiness. This designing creature loiters about and watches the Ceratina building her nest. When the nest builder has filled a cell with pollen and deposited an egg, and has departed to seek material for a partition, the ichneumon sneaks slyly in and lays one of its eggs in the cell, too; so, when the bee comes back, she unconsciously walls in with her child its deadliest foe. When the young bee has nearly attained full size, the ichneumon egg hatches into a voracious little grub, which evidently looks upon the fat bee-larva as a hungry child might look upon a choice beefsteak. It at once falls to eating the helpless creature, which conveniently proves to be sufficient food to nourish the little interloper until the latter has completed its growth. When sufficiently grown, the young ichneumon spins a beautiful silken cocoon about itself, in the most innocent manner, and changes to a pupa. In this state it waits until the bees in the tunnel above it have matured and departed, and then issues forth a fully developed ichneumon, and flies into the world to play its hereditary tricks upon any unwary insect it may chance to meet. We found one of these ichneumon cocoons in the middle cell of a Ceratina nest. Only one of the mature bees was found in the tunnel below the cocoon, and it had its head pointed downward; thus telling, as plainly as words could have told, that, disgusted with the creature it found obstructing its upward pathway, it had turned about with a firm intention to dig out by way of China, or die in the attempt! And, undoubtedly, many which escape being eaten by the parasite, die thus from imprisonment.

This completes the record of what I know of the life-history of this little carpenter-bee. I hope, however, that the boy and girl naturalists who read this history will gather the dry twigs of elder and of sumac at different seasons of the year, and then, by patiently studying them, they may be able to supply for themselves many interesting particulars which I have yet to learn.